

III. REMARKS

In the Office Action, claims 1, 8, 10-12, 14-16 and 18 were rejected under 35 U.S.C. 103 as being unpatentable over Chong (US 6,590,946), in view of Li (IEEE publication, from IDS, namely, "Analysis-by-Synthesis Multimode Harmonic Speech Coding at 4 KB/S") for reasons set forth in the Action. Claims 2-3, 9, 13 and 17 were rejected under 35 U.S.C. 103 as being unpatentable over Chong in view of Li and Manjunath (US 6,456,964); Claims 4-5 were rejected under 35 U.S.C. 103 as being unpatentable over Chong in view of Li, Manjunath and Kleijn (US 6,223,151); Claim 7 was rejected under 35 U.S.C. 103 as being unpatentable over Chong in view of Li, Manjunath, Kleijn (US 6,223,151) and Kleijn (US 5517595); and Claim 6 was rejected under 35 U.S.C. 103 as being unpatentable over Chong in view of Li, Manjunath, and Donovan (US 6,266,637) for reasons set forth in the Action.

With respect to the rejections under 35 U.S.C. 103, various ones of the claims are amended and the following argument is presented to distinguish the claimed subject matter from the teachings of the cited art, considered individually and in combination, thereby to overcome the rejections and to show the presence of allowable subject matter in the claims.

In the combination of the teachings of Chong with Li, the examiner notes (page 3 of the Action) that Chong does not specifically disclose the step of determining at least one voicing parameter based on the modified signal, wherein the modified signal may be voiced or unvoiced. The examiner relies on Li to provide the additional teaching.

Li discloses a speech codec which has a multi-mode functionality. The examiner is mainly referring to figure 3 of Li, where at first linear prediction coding is done for obtaining the residual signal. Either the residual or the actual speech signal is directed to a pitch estimation module. This block at first pre-classifies the input speech into two different categories of speech, the first category including unvoiced speech and silence,

and the second category including voiced speech and transition speech. Pitch candidates are generated by autocorrelation. The second category of speech is further classified and the final pitch is determined based on the pitch candidates. The signal is also modified based on the residual signal. Finally, the pitch is further refined, and harmonic bandwidth is estimated. The signal modification is formed similarly as disclosed in a further referred document [9] "TIA/EIA/IS 127, Enhanced Variable Rate Codec (EVRC), in TIA Draft Standard, 1996". The EVRC uses a generalized Code Excited Linear Prediction algorithm, which further matches a time warped version of the original residual that conforms to a simplified pitch contour. In other words, the EVRC modifies the residual signal by shifting the pitch pulses for matching a target residual signal (see document "Enhanced Variable Rate Codec, Speech Service Option 3 for Wideband Spectrum Digital Systems, by 3rd Generation Partnership Project 2, April 2004", pages 4-1, 4-2 and 4-36...44. Furthermore, the EVRC basically does some pre-processing as the high-pass and adaptive noise suppression filtering. As is mentioned on page 1369, chapter 5, lines 6-13 of Li, it appears that the encoding mode is set according to the voicing classification. It is believed that the signal modification (pitch shifting) in the present invention is performed with a different principle than in Li.

Chong discloses a method for shifting peak instants of a digitized speech signal in time domain. As depicted in Figs. 1 and 2 of Chong, pitch pulses are detected from analysis frame data taken from an input sequence. Voicing data is classified from the input sequence as well, and a preliminary estimate of the signal period is calculated in a functional block performing "pitch and voicing" analysis. The voicing information as well as the yet unshifted pulse locations are directed to a block performing "mapping optimization". This block performs the transformation from the unshifted time scale into the shifted (so-called "warped") time scale. New sampling instants are calculated in view of the mapping parameter and shifted sample values are calculated as well by using also the original analysis frame data. Thus, shifted sample sequence with altered peak instants is achieved as an output signal.

With respect to the amendment of the claims, claim 1 is clarified by inclusion of two additional features. After the pitch period has been estimated from the formulated signal, location of at least one pitch pulse is estimated. Thereafter, an average pitch period is determined using the location of the pitch pulses. These clarifications are based on the present specification at page 10, line 11 through page 11, line 3. Corresponding amendments are made to the other independent claims. Also, a few formal clarifications are made to the claims. Claim 3 now reveals the feature disclosed on page 10, lines 27-29 of the specification. Claim 4 is cancelled since its subject matter is dealt with in amended claim 1.

In the Office Action, the examiner noted that Li teaches, by citing the signal modification block in Fig. 3, the step of determining at least one voicing parameter based on the modified signal, the voicing parameter being either voiced or unvoiced. However, the diagram actually shows that the signal which is to be modified is the residual signal $r(n)$, namely, the output of the analysis filter. This modified residual signal $r'(n)$ is then used as an input to the V/UV Model Parameter Estimator. The signal modification block performs two functions: 1) It performs signal modification on the residual signal, and 2) it provides an estimation of pitch. It is these two factors that are shown as inputs to the V/UV model. Therefore, there appears to be no motivation in this reference to suggest that the pitch in the residual signal should be modified to "enhance" the pitch characteristic of the signal for V/UV classification purposes, since the actual value of the estimated pitch is provided to the V/UV decision block, in addition to the modified residual signal. Therefore, the V/UV decision block would use the estimated pitch value to formulate its decision, and not a value obtained from the modified residual signal. Thus, it is submitted that there is no motivation to combine Chong with Li because Chong teaches the method of modifying the signal according to an average pitch, but there is no basis to provide this signal to a V/UV block such as disclosed in LI, since Li would use an actual estimate of pitch to formulate its decision.

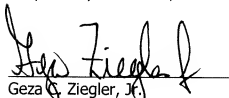
There is no indication in the teaching of Li that the use of a modified signal (in the sense that "modified" is used in the present specification) for determination of a voicing parameter would provide the benefit disclosed in the present specification. Thus, the examiner's citation of the combined teachings of Chong and Li can serve to show that the technology for building the present invention exists, but there is no motivation to combine the references.

Therefore, it is urged that the foregoing amendment and argument have overcome the rejections to provide allowable subject matter in the claims.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

A check in the amount of \$120.00 is enclosed for a one month extension of time. The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,


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